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DECUS NO.	8-294
TITLE	LETTERING PROGRAM
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SOURCE LANGUAGE	PAL

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LETTERING PROGRAM

DECUS Program Library Write-up

DECUS No. 8-294

ABSTRACT

This program produces large, easily read lettering on paper tape using either the high or low speed punch. All printed teletype characters are included, and non-printing characters are ignored. The letters are eight columns high and proportional in width. If used with the disk monitor system, the program will return to it if a Control/C is typed.

OPERATING INSTRUCTIONS

The program should be loaded with the binary loader and started at 200. When the computer responds with *OPT-, type R to use the high speed punch or T for the low speed (teletype) punch. Turn on the punch and proceed to type.

PROGRAM LOGIC

Each character is represented by a series of numbers, terminated by a negative number. Each number corresponds to one frame of tape and the series corresponds to the character. Because the numbers representing each character are accessed through an array of pointers, the assembler adjusts the pointers for the width of the letters. This makes the letter particularly easy to modify should the user desire to do so.

SAVING

If used with the disk monitor system, the program should be saved with the command:

SAVE LETR! 200-1423;200

A	0477
AMPERS	1132
APOSTR	1143
ASTERI	1146
ATSIGN	1157
B	0507
BACKAR	1171
BACKSL	1203
C	0516
COLON	1214
COMMA	1217
CONTIN	0327
CONTRL	0347
COUNT	0340
D	0526
DOLLAR	1222
E	0536
ECHO	0346
EIGHT	1114
EQUALS	1233
EXCLAI	1244
F	0545
FIVE	1067
FOUR	1057
G	0554
GREATE	1247
H	0564
HIGH	0343
IYIYI	0574
J	0603
K	0612
L	0622
LBRACK	1265
LESSTH	1256
LETTER	0337
LISN	0276
LOW	0342
LPAREN	1273
M	0631
MASK	0354
MESS	0356
MINUS	1302
MONITO	0341
MR	0351
MT	0350
M240	0352
M340	0353
N	0644
NINE	1123
NOTHIN	0344
N200	0355
O	0655
ONE	1034
P	0666
PAT	0263
PERCEN	1313
PERIOD	1324
PLACE	0010
PLUS	1327

PRINT 0326
 PUN 0321
 PUNCH 0345
 Q 0675
 QUESTI 1340
 QUICK 0232
 QUOTE 1347
 R 0706
 RBRACK 1355
 READ 0237
 RPAREN 1361
 S 0716
 SEMICO 1366
 SEVEN 1105
 SIX 1076
 SKIP 0271
 SLASH 1371
 SLOW 0225
 SPACE 1402
 START 0376
 T 0725
 TACIT 0335
 THREE 1050
 TICTAC 1403
 TWO 1041
 TYPE 0314
 U 0734
 UPARRO 1415
 V 0744
 W 0754
 X 0767
 Y 1000
 ZEE 1011
 ZERO 1022

0200 6046
 0201 6032
 0202 7300
 0203 1356
 0204 3010
 0205 4326
 0206 4276
 0207 4314
 0210 4326
 0211 7200
 0212 1337
 0213 1350
 0214 7450
 0215 5225
 0216 7200
 0217 1337
 0220 1351
 0221 7450
 0222 5232
 0223 4326
 0224 5741

TLS		/CLEAR
KCC		/ FLAGS
CLA	CLL	
TAD	MESS	/INTRODUCTORY
DCA	PLACE	/ DIALOGUE
JMS	PRINT	/TYPE "*OPT-"
JMS	LISN	/GET LETTER
JMS	TYPE	/ AND ECHO IT
JMS	PRINT	
CLA		
TAD	LETTER	
TAD	MT	/IS IT
SNA		/ A "T"?
JMP	SLOW	
CLA		
TAD	LETTER	/IS IT
TAD	MR	/ AN "R"?
SNA		
JMP	QUICK	
JMS	PRINT	
JMP I	MONITOR	/BAD CHARACTER, ABORT

0225	1344	SLOW,	TAD	NOTHING	/(DON'T ECHO)
0226	3346		DCA	ECHO	
0227	1342		TAD	LOW	/(LOW SPEED PUNCH)
0230	3345		DCA	PUNCH	
0231	5237		JMP	READ	
0232	1342	QUICK,	TAD	LOW	/(ECHO ON TYPEWRITER)
0233	3346		DCA	ECHO	
0234	1343		TAD	HIGH	/(HIGH SPEED PUNCH)
0235	3345		DCA	PUNCH	
0236	6022		PCF		/CLEAR FLAG
0237	4276	READ,	JMS	LISN	/READ A LETTER
0240	1352		TAD	M240	/TEST TO
0241	7510		SPA		/SEE IF THE
0242	5237		JMP	READ	/LETTER IS
0243	7200		CLA		/O K
0244	1337		TAD	LETTER	
0245	1353		TAD	M340	/ACCEPTABLE
0246	7500		SMA		/RANGE: 240-337)
0247	5237		JMP	READ	
0250	7200		CLA		/LETTER
0251	1337		TAD	LETTER	/IS OK,
0252	4746		JMS I	ECHO	/SO ECHO IT.
0253	7300		CLA CLL		
0254	1337		TAD	LETTER	/GET LETTER
0255	1352		TAD	M240	/AND SUBTRACT 240
0256	1376		TAD	START	/START OF TABLE OF CONTENTS
0257	3010		DCA	PLACE	/STORE POINTER TO LETTER
0260	7040		CMA		/SUBTRACT ONE FOR AUTO-INDEX
0261	1410		TAD I	PLACE	/GET BEGINNING OF LETTER
0262	3010		DCA	PLACE	/AND STORE.
0263	1410	PAT,	TAD I	PLACE	/GET PATTERN
0264	7510		SPA		/AND PUNCH
0265	5271		JMP	SKIP	/<0 MEANS END
0266	4745		JMS I	PUNCH	/OF LETTER.
0267	7200		CLA		
0270	5263		JMP	PAT	/NEXT PATTERN
0271	3340	SKIP,	DCA	COUNT	/SKIP NUMBER
0272	4745		JMS I	PUNCH	/OF SPACES
0273	2340		ISZ	COUNT	/INDICATED BY THE
0274	5272		JMP	.-2	/NEGATIVE NUMBER IN THE AC.
0275	5237		JMP	READ	
0276	0000	LISN,	0000		/READ
0277	6031		KSF		/A LETTER
0300	5277		JMP	.-1	
0301	6036		KRB		
0302	0354		AND	MASK	/MAKE SURE THE EIGHTH
0303	1355		TAD	N200	/PARITY) BIT IS ON.
0304	3337		DCA	LETTER	/STORE IT
0305	1337		TAD	LETTER	
0306	1347		TAD	CONTRL	/RETURN TO DISK MONITOR
0307	7450		SNA		/SYSTEM IF A CONTROL
0310	5741		JMP I	MONITOR	/C IS TYPED.
0311	7200		CLA		
0312	1337		TAD	LETTER	
0313	5676		JMP I	LISN	/RETURN
0314	0000	TYPE,	0000		/SUBROUTINE TO
0315	6041		TSF		/TYPE OR PUNCH
0316	5315		JMP	.-1	/ON THE LOW
0317	6046		TLS		/SPEED PUNCH
0320	5714		JMP I	TYPE	

0321	0000	PUN,	0000	/SUBROUTINE
0322	6026		PLS	/ PUNCHES
0323	6021		PSF	/ PATTERN IN
0324	5323		JMP	/ ACCUMULATOR ON
0325	5721		JMP I	/ HIGH SPEED PUNCH
0326	0000	PRINT,	0000	/SUBROUTINE
0327	7200	CONTIN,	CLA	/ TYPES
0330	1410		TAD I	/ OUT
0331	7510		SPA	/ MESSAGE
0332	5726		JMP I	/ AND RETURNS
0333	4314		JMS	/ WHEN IT GETS
0334	5327		JMP	/ A NUMBER < 0
0335	0000	TACIT,	0000	/SUBROUTINE DOES
0336	5735		JMP I	/ ABSOLUTELY NOTHING
0337	0000	LETTER,	0000	
0340	0000	COUNT,	0000	
0341	7600	MONITOR,	7600	/SA OF DISK MONITOR
0342	0314	LOW,	TYPE	
0343	0321	HIGH,	PUN	
0344	0335	NOTHING,	TACIT	
0345	0000	PUNCH,	0000	
0346	0000	ECHO,	0000	
0347	7575	CONTRL,	7575	/COMPLEMENT OF CONTROL-C
0350	7454	MT,	7454	/COMPLEMENT OF "T"
0351	7456	MR,	7456	/COMPLEMENT OF "R"
0352	7540	M240,	-240	
0353	7440	M340,	-340	
0354	0177	MASK,	177	/BITS 1-7 ON
0355	0200	N200,	200	/BIT 8 ON
0356	0356	MESS,	MESS	/PRINT MESSAGE
0357	0215		215	/CARRIAGE RETURN
0360	0212		212	/LINE FEED
0361	0252		252	/ *
0362	0317		317	/ 0
0363	0320		320	/ P
0364	0324		324	/ T
0365	0255		255	/ -
0366	7777		-1	/END
0367	0215		215	/CARRIAGE RETURN
0370	0212		212	/LINE FEED
0371	7777		-1	/END
0372	0277		277	/ ?
0373	0215		215	/DON'T YOU KNOW
0374	0212		212	/ WHAT THIS IS YET?
0375	7777		-1	/END
0376	0376			

START, START	/POINTERS FOR LETTERS
0377 1402	SPACE
0400 1244	EXCLAIM
0401 1347	QUOTE
0402 1403	TICTACTOE
0403 1222	DOLLAR
0404 1313	PERCENT
0405 1132	AMPERSAND
0406 1143	APOSTROPHE
0407 1273	LPAREN
0410 1361	RPAREN
0411 1146	ASTERISK
0412 1327	PLUS
0413 1217	COMMA
0414 1302	MINUS
0415 1324	PERIOD
0416 1371	SLASH
0417 1022	ZERO
0420 1034	ONE
0421 1041	TWO
0422 1050	THREE
0423 1057	FOUR
0424 1067	FIVE
0425 1076	SIX
0426 1105	SEVEN
0427 1114	EIGHT
0430 1123	NINE
0431 1214	COLON
0432 1366	SEMICOLON
0433 1256	LESSTHAN
0434 1233	EQUALS
0435 1247	GREATER
0436 1340	QUESTION
0437 1157	ATSIGN
0440 0477	A
0441 0507	B
0442 0516	C
0443 0526	D
0444 0536	E
0445 0545	F
0446 0554	G
0447 0564	H
0450 0574	IYIYI
0451 0603	J
0452 0612	K
0453 0622	L
0454 0631	M
0455 0644	N
0456 0655	O
0457 0666	P
0460 0675	Q
0461 0706	R
0462 0716	S
0463 0725	T
0464 0734	U
0465 0744	V
0466 0754	W
0467 0767	X
0470 1000	Y
0471 1011	ZEE

0472	1265		LBRACKET
0473	1203		BACKSLASH
0474	1355		RBRACKET
0475	1415		UPARROW
0476	1171		BACKARROW
0477	0376	A,	376
0500	0377		377
0501	0033		033
0502	0033		033
0503	0033		033
0504	0377		377
0505	0376		376
0506	7776		-2
0507	0377	B,	377
0510	0377		377
0511	0333		333
0512	0333		333
0513	0377		377
0514	0166		166
0515	7776		-2
0516	0074	C,	074
0517	0176		176
0520	0303		303
0521	0303		303
0522	0303		303
0523	0347		347
0524	0146		146
0525	7776		-2
0526	0377	D,	377
0527	0377		377
0530	0303		303
0531	0303		303
0532	0303		303
0533	0176		176
0534	0074		074
0535	7776		-2
0536	0377	E,	377
0537	0377		377
0540	0333		333
0541	0333		333
0542	0303		303
0543	0303		303
0544	7776		-2
0545	0377	F,	377
0546	0377		377
0547	0033		033
0550	0033		033
0551	0003		003
0552	0003		003
0553	7776		-2
0554	0074	G,	074
0555	0176		176
0556	0303		303
0557	0323		323
0560	0323		323
0561	0367		367
0562	0166		166
0563	7776		-2

/ L E T T E R S

0564	0377	H,	377
0565	0377		377
0566	0030		030
0567	0030		030
0570	0030		030
0571	0377		377
0572	0377		377
0573	7776		-2
0574	0303	IYIYI,	303
0575	0303		303
0576	0377		377
0577	0377		377
0600	0303		303
0601	0303		303
0602	7776		-2
0603	0140	J,	140
0604	0340		340
0605	0300		300
0606	0300		300
0607	0377		377
0610	0177		177
0611	7776		-2
0612	0377	K,	377
0613	0377		377
0614	0030		030
0615	0064		064
0616	0146		146
0617	0303		303
0620	0201		201
0621	7776		-2
0622	0377	L,	377
0623	0377		377
0624	0300		300
0625	0300		300
0626	0300		300
0627	0300		300
0630	7776		-2
0631	0377	M,	377
0632	0377		377
0633	0006		006
0634	0014		014
0635	0030		030
0636	0030		030
0637	0014		014
0640	0006		006
0641	0377		377
0642	0377		377
0643	7776		-2
0644	0377	N,	377
0645	0376		376
0646	0004		004
0647	0010		010
0650	0030		030
0651	0060		060
0652	0177		177
0653	0377		377
0654	7776		-2

0655	0074	O,	074
0656	0176		176
0657	0303		303
0660	0303		303
0661	0303		303
0662	0303		303
0663	0176		176
0664	0074		074
0665	7776		-2
0666	0377	P,	377
0667	0377		377
0670	0033		033
0671	0033		033
0672	0037		037
0673	0016		016
0674	7776		-2
0675	0074	Q,	074
0676	0176		176
0677	0303		303
0700	0303		303
0701	0323		323
0702	0343		343
0703	0176		176
0704	0274		274
0705	7776		-2
0706	0377	R,	377
0707	0377		377
0710	0033		033
0711	0073		073
0712	0177		177
0713	0316		316
0714	0200		200
0715	7776		-2
0716	0156	S,	156
0717	0337		337
0720	0333		333
0721	0333		333
0722	0373		373
0723	0166		166
0724	7776		-2
0725	0003	T,	003
0726	0003		003
0727	0377		377
0730	0377		377
0731	0003		003
0732	0003		003
0733	7776		-2
0734	0077	U,	077
0735	0177		177
0736	0300		300
0737	0300		300
0740	0300		300
0741	0177		177
0742	0077		077
0743	7776		-2

0744	0377	V,	377
0745	0377		377
0746	0140		140
0747	0060		060
0750	0030		030
0751	0017		017
0752	0007		007
0753	7776		-2
0754	0377	W,	377
0755	0377		377
0756	0140		140
0757	0060		060
0760	0030		030
0761	0030		030
0762	0060		060
0763	0140		140
0764	0377		377
0765	0377		377
0766	7776		-2
0767	0303	X,	303
0770	0146		146
0771	0074		074
0772	0030		030
0773	0030		030
0774	0074		074
0775	0146		146
0776	0303		303
0777	7776		-2
1000	0007	Y,	007
1001	0017		017
1002	0030		030
1003	0370		370
1004	0370		370
1005	0030		030
1006	0017		017
1007	0007		007
1010	7776		-2
1011	0303	ZEE,	303
1012	0343		343
1013	0373		373
1014	0333		333
1015	0313		313
1016	0317		317
1017	0307		307
1020	0303		303
1021	7776		-2
1022	0274		

ZERO, 274		/ N U M B E R S
1023	0176	176
1024	0343	343
1025	0323	323
1026	0313	313
1027	0303	303
1030	0307	307
1031	0176	176
1032	0075	075
1033	7776	-2
1034	0302	ONE, 302
1035	0377	377
1036	0377	377
1037	0300	300
1040	7776	-2
1041	0366	TWO, 366
1042	0373	373
1043	0333	333
1044	0333	333
1045	0337	337
1046	0316	316
1047	7776	-2
1050	0146	THREE, 146
1051	0303	303
1052	0303	303
1053	0313	313
1054	0377	377
1055	0166	166
1056	7776	-2
1057	0037	FOUR, 037
1060	0037	037
1061	0030	030
1062	0030	030
1063	0376	376
1064	0376	376
1065	0030	030
1066	7776	-2
1067	0157	FIVE, 157
1070	0337	337
1071	0333	333
1072	0333	333
1073	0373	373
1074	0163	163
1075	7776	-2
1076	0176	SIX, 176
1077	0377	377
1100	0333	333
1101	0333	333
1102	0373	373
1103	0166	166
1104	7776	-2
1105	0003	SEVEN, 003
1106	0343	343
1107	0363	363
1110	0033	033
1111	0017	017
1112	0007	007
1113	7776	-2

1114	0166	EIGHT,	166
1115	0377		377
1116	0333		333
1117	0333		333
1120	0377		377
1121	0166		166
1122	7776		-2
1123	0116	NINE,	116
1124	0337		337
1125	0333		333
1126	0333		333
1127	0377		377
1130	0176		176
1131	7776		-2
1132	0166	AMPERSAND,	166
1133	0377		377
1134	0313		313
1135	0337		337
1136	0366		366
1137	0140		140
1140	0340		340
1141	0200		200
1142	7776		-2
1143	0007	APOSTROPHE,	007
1144	0007		007
1145	7776		-2
1146	0102	ASTERISK,	102
1147	0146		146
1150	0044		044
1151	0333		333
1152	0333		333
1153	0044		044
1154	0146		146
1155	0102		102
1156	7776		-2
1157	0074	ATSIGN,	074
1160	0102		102
1161	0231		231
1162	0245		245
1163	0245		245
1164	0235		235
1165	0241		241
1166	0122		122
1167	0074		074
1170	7776		-2
1171	0030	BACKARROW,	030
1172	0070		070
1173	0174		174
1174	0336		336
1175	0232		232
1176	0030		030
1177	0030		030
1200	0030		030
1201	0030		030
1202	7776		-2

/ P U N C T U A T I O N

1203	0003	BACKSLASH, 003	
1204	0006		006
1205	0004		004
1206	0010		010
1207	0030		030
1210	0060		060
1211	0140		140
1212	0300		300
1213	7776		-2
1214	0306	COLON,	306
1215	0306		306
1216	7775		-3
1217	0240	COMMA,	240
1220	0140		140
1221	7774		-4
1222	0316	DOLLAR,	316
1223	0337		337
1224	0333		333
1225	0377		377
1226	0377		377
1227	0333		333
1230	0373		373
1231	0163		163
1232	7776		-2
1233	0066	EQUALS,	066
1234	0066		066
1235	0066		066
1236	0066		066
1237	0066		066
1240	0066		066
1241	0066		066
1242	0066		066
1243	7776		-2
1244	0337	EXCLAIM,	337
1245	0337		337
1246	7776		-2
1247	0201	GREATER,	201
1250	0303		303
1251	0146		146
1252	0064		064
1253	0030		030
1254	0010		010
1255	7776		-2
1256	0010	LESS THAN,	010
1257	0030		030
1260	0064		064
1261	0146		146
1262	0303		303
1263	0201		201
1264	7776		-2
1265	0000	LBRACKET,	000
1266	0000		000
1267	0377		377
1270	0377		377
1271	0303		303
1272	7776		-2

1273	0000	LPAREN,	000
1274	0000		000
1275	0174		174
1276	0176		176
1277	0303		303
1300	0201		201
1301	7776		-2
1302	0030	MINUS,	030
1303	0030		030
1304	0030		030
1305	0030		030
1306	0030		030
1307	0030		030
1310	0030		030
1311	0030		030
1312	7776		-2
1313	0306	PERCENT,	306
1314	0151		151
1315	0071		071
1316	0036		036
1317	0150		150
1320	0224		224
1321	0226		226
1322	0143		143
1323	7776		-2
1324	0300	PERIOD,	300
1325	0300		300
1326	7776		-2
1327	0030	PLUS,	030
1330	0030		030
1331	0030		030
1332	0377		377
1333	0377		377
1334	0030		030
1335	0030		030
1336	0030		030
1337	7776		-2
1340	0006	QUESTION,	006
1341	0003		003
1342	0333		333
1343	0333		333
1344	0007		007
1345	0006		006
1346	7776		-2
1347	0007	QUOTE,	007
1350	0007		007
1351	0000		000
1352	0007		007
1353	0007		007
1354	7776		-2
1355	0303	RBRACKET,	303
1356	0377		377
1357	0377		377
1360	7774		-4
1361	0201	RPAREN,	201
1362	0303		303
1363	0176		176
1364	0074		074
1365	7774		-4

1366	0246	SEMICOLON, 246	
1367	0146		146
1370	7775		-3
1371	0300	SLASH,	300
1372	0140		140
1373	0060		060
1374	0030		030
1375	0010		010
1376	0004		004
1377	0006		006
1400	0003		003
1401	7776		-2
1402	7773	SPACE,	-5
1403	0146	TICTACTOE, 146	
1404	0146		146
1405	0377		377
1406	0377		377
1407	0146		146
1410	0377		377
1411	0377		377
1412	0146		146
1413	0146		146
1414	7776		-2
1415	0004	UPARROW,	004
1416	0006		006
1417	0377		377
1420	0377		377
1421	0006		006
1422	0004		004
1423	7776		-2
		PLACE=10	

The following overlay can be used with the lettering program in order to read from the high speed reader. It should be loaded after the lettering program and the result started at 200. Be sure to have the symbolic tape to be punched in the high speed reader before starting the computer.

BLANK 0216
ECHO 0346
LETTER 0337
LISN 0276
MASK 0354
MCR 0215
N200 0355
PUN 0321
PUNCH 0345
READ 0237
TACIT 0335
TEST 0204

*203

0203	5236	JMP	READ-1	/AVOID INTRODUCTORY DIALOGUE
0204	7200	TEST,	CLA	
0205	1215	TAD	MCR	/SEE IF IT'S A
0206	1337	TAD	LETTER	/CARRIAGE RETURN
0207	7440	SZA		
0210	5237	JMP	READ	
0211	1216	TAD	BLANK	/IF IT IS,
0212	3337	DCA	LETTER	/ CONSIDER IT
0213	1337	TAD	LETTER	/ AS A BLANK.
0214	5240	JMP	READ+1	
0215	7563	MCR,	7563	/COMPLEMENT OF CARRIAGE RETURN
0216	0240	BLANK,	240	/CODE FOR BLANK

*242

0242	5204	JMP	TEST	/CHECK FOR CR BEFORE REJECTING
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*277

0277	6014	RFC		/FETCH CHARACTER
0300	6011	RSF		/ AND WAIT UNTIL
0301	5300	JMP	.-1	/ IT ARRIVES
0302	7300	CLA	CLL	
0303	6012	RRB		/READ READER BUFFER
0304	0354	AND	MASK	/MAKE SURE THE EIGHTH
0305	1355	TAD	N200	/ (PARITY) BIT IS ON.
0306	3337	DCA	LETTER	/STORE LETTER
0307	1337	TAD	LETTER	
0310	5676	JMP I	LISN	/RETURN

*345

0345	0321	PUNCH,	PUN	/USE HIGH SPEED PUNCH
0346	0335	ECHO,	TACIT	/DON'T ECHO CHARACTERS

PUN=321

LETTER=337

TACIT=335

READ=237

LISN=276

MASK=354

N200=355